# Temperature Controllers





### Model TEC-9100 1/16 DIN Temperature Controller



## Configurable for 4 Programmable Outputs and optional NEMA 4X/IP65 Front Panel!

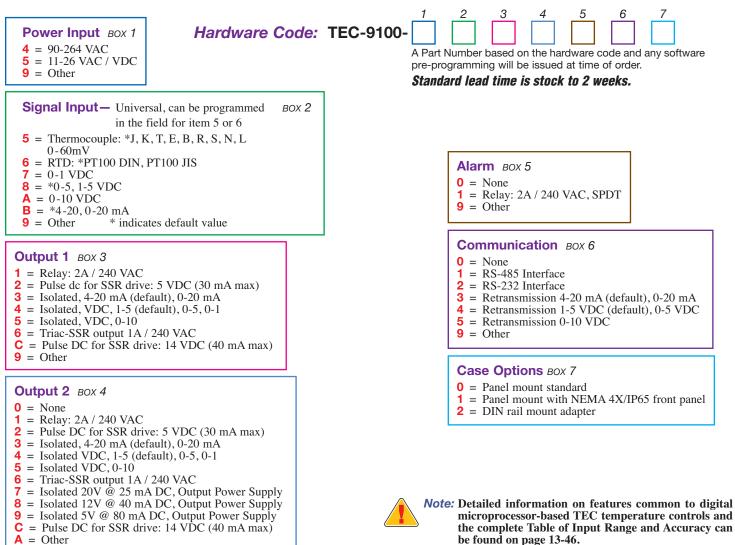
Agency Approvals: RoHS



The TEC-9100 is also available with a black faceplate.

### **Design Features**

- \* 1/16 DIN size 48 mm × 48 mm
- \* Fuzzy Logic PID heat and cool control
- \* PID Control Auto-tuning on cold or warm start
- \* Short panel depth only 4-1/8" (105 mm) required
- \* Universal programmable sensor input
- \* Highly versatile 6 types of output available
- \* Output 2 can be programmed as output or alarm
- \* Universal input power 90-250 VAC or 11-26 VAC/VDC
- \* Highly accurate universal input
- \* Optional NEMA 4X/IP65 front panel
- \* Bumpless transfer to manual mode during sensor failure
- \* Wide variety of alarm mode selections
- \* Optional RS-232 or RS-485 communications interface
- \* Bright 0.40" (10 mm) red LED process display 0.31" (8 mm) green LED setpoint display
- \* High performance at a very low price



= Other Α



**Temperature Controllers** 

Model **TEC-9100** Specifications (1/16 DIN)

#### **Power Input**

**Standard**: 90-250 VAC, 47-63 Hz, 10 VA, 5W maximum **Optional**: 11-26 VAC / VDC, 10 VA, 5W maximum

#### Signal Input

**Resolution:** 18 bits **Sampling Rate:** 5 samples / second **Accuracy:** ±.24% of span typical

Maximum Rating: -2 VDC minimum, 12 VDC maximum (1 minute for mA input)

**Temperature Effect:**  $\pm 1.5 \ \mu\text{V} / ^{\circ}\text{C}$  for all inputs except mA input  $\pm 3.0 \ \mu\text{V} / ^{\circ}\text{C}$  for mA input

Sensor Lead Resistance Effect: T/C:  $0.2\mu$ V/ohm 3-wire RTD: 2.6°C/ohm of resistance difference of two leads **Burn-out Current**: 200nA

Common Mode Rejection Ratio (CMRR): 120 dB

Normal Mode Rejection Ratio (NMRR): 55 dB

**Sensor Break Detection**: Sensor open for TC, RTD and mV inputs; sensor short for RTD input; below 1 mA for 4-20 mA input; below 0.25V for 1-5V input; unavailable for other inputs **Sensor Break Response Time**: Within 4 seconds for TC, RTD and mV inputs; 0.1 second for 4-20 mA and 1-5 V inputs

#### Output 1 / Output 2

Relay Rating: 240 VAC, 2 Amp

**Pulsed Voltage**: Source voltage 5V, Current limiting resistance  $66\Omega$ 

Linear Output — Characteristics

Туре	Zero	Span	
Tolerance	Tolerance	Capacity	Load
4-20 mA	3.6-4.0 mA	20-21 mA	$500\Omega \text{ max}$
0-20 mA	0 mA	20-21 mA	$500\Omega \text{ max}$
0-5 VDC	0 VDC	5-5.25 VDC	$10 \text{ K}\Omega \text{ min}$
1-5 VDC	0.9-1.0 VDC	5-5.25 VDC	$10 \text{ K}\Omega \text{ min}$
0-10 VDC	0 VDC	10-10.5 VDC	10 KΩ min

**Resolution**: 15 bit analog to digital converter

Output Regulation: 0.02% for full load change

Output Settling Time: 0.1 sec. (stable to 99.9%)

Isolation Breakdown Voltage: 1000 VAC

**Temperature Effect**: ±0.01 % of span/°C

Solid State Relay (Triac) Output

Rating: 1A / 240 VAC

Inrush Current: 20A for 1 cycle

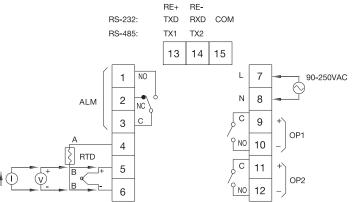
Min. Load Current: 50 mA rms

Max. Off-state Leakage: 3 mA rms

Max. On-state Voltage: 1.5 VAC rms

**Insulation Resistance:** 1000 Megohms minimum at 500 VDC **Dielectric Strength:** 2500 VAC for 1 minute

#### **Rear Terminal Connections**



#### Output 2 / Alarm 1 – Programmable

Alarm 1 Relay: Form A, (NO) Maximum rating: 240 VAC, 2 Amp Alarm Functions: Dwell timer Deviation High / Low Alarm Deviation Band High / Low Alarm Process High / Low Alarm Sensor Break Alarm Alarm Mode: Normal, Latching, Hold, Latching / Hold Dwell Timer: 0 - 4553.6 minutes

### **Data Communications**

Interface: RS-232 (1 unit), RS-485 (up to 247 units)					
Protocol: Modbus Protocol – RTU mode					
Address: 1-247 B	Baud Rate: 0.3 - 38.4 Kbits/sec				
Data Bits: 7 or 8 bits P	Parity Bit: None, Even or Odd				
Stop Bit: 1 or 2 bits C	Communication Buffer: 160 bytes				
User Interface					
Dual 4-digit LED Display: 0.40" (10 mm) Red Process Display					
	0.31" (8 mm) Green Setpoint Display				
Keypad: 4 keys					
Programming Port: For automatic setup, calibration and testing					

#### **Control Mode**

Output 1: Reverse (heating) or direct (cooling) action Output 2: PID cooling control, cooling P band 50-300% of PB, dead band -36.0 to 36.0% of PB **On-Off:** 0.1 - 90.0°F hysteresis control (P band = 0) P or PD: 0 - 100.0% offset adjustment PID: Fuzzy logic modified Proportional band: 0.1 - 900°F Integral time: 0 - 1000 seconds Derivative time: 0 - 360 seconds Cycle Time: 0.1 - 90 seconds Manual Control: Heat (MV1) and Cool (MV2) Auto-tuning: Cold start and warm start Failure Mode: Auto-transfer to manual mode with sensor break or A-D converter damage **Ramping Control**: 0 - 900°F/min or 0 - 900°F/hr ramp rate **Environmental and Physical Operating Temperature:** 14 to 122°F (-10 to 50°C) Humidity: 0 to 90% RH, non-condensing Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute **Dimensions**: 1-7/8 × 1-7/8 × 4-9/16" (48 × 48 × 116 mm) H×W×D Depth behind panel: 4-1/8" (105 mm) Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W Weight: 0.33 lb. (150 grams)

#### **Approval Standards**

Safety: UL61010C-1, CSA C22.2 No. 24-93 EN61010-1 (IEC1010-1)

EMC: EN61326 Protective Class: Front Panel: IP50, optional NEMA 4X/IP65

Housing and Terminals: IP 20

#### Stock and Common Part Numbers

(Power Input: 90-250 VAC, no data com, no NEMA 4X)

Part Number	Signal Input	Output 1	Output 2	Alarm
TEC14001	tc	relay	relay	none
TEC14002	tc	relay	none	none
TEC14003	tc	relay	none	relay
TEC14004	tc	4-20 mA	none	none
TEC14005	RTD	relay	none	none
TEC14006	RTD	relay	none	relay
TEC14007	RTD	DC pulse	none	none
<b>TEC14008</b>	RTD	DC pulse	none	relay /